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24 September 1964

MEMORANDUM FOR THE RECORD

Subject: Freon 113, Chemical Breakdown of

1. In a recent discussion with [] the Department of Agriculture Research Laboratory, Beltsville, Maryland, I learned that the Freons as a group are not completely chemically inert and can break down into dangerous compounds. One of these is phosgene [] did not have any information as to the behavior of Freon 113 under uv radiation and suggested that I discuss this matter []

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2. In my discussion [] I found out that Freon can, under suitable conditions, break down to form perchloroisobutaline, which is fatal in concentration of less than 1 ppm. He did not have any information as to its behavior under uv radiation but suggested that we vent the system properly to prevent any possibility of causing illness or death to the operators.

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3. [] is forwarding all available information to me, and I will pass on any additional information that I receive.

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4. Because of the possibility of a serious health hazard existing, it is suggested that the [] film reader be held [] until it can be modified to allow a suitable air scavenging system to be attached. This should remove all the Freon before it can mix with room atmosphere.

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Exploratory Development Laboratory Branch, P&DS

Declass Review by NIMA / DoD

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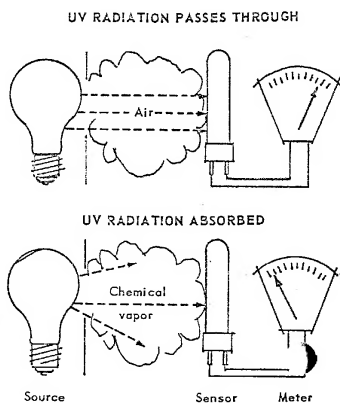
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IDEAS — ELECTRICAL

Detector Senses Vapor by UV Absorption

Instrument recalibrates itself Using vapor sample at selected Concentration as reference.

Lars G. Soderholm, Midwest Editor



An ultraviolet source with a specific spectrum is monitored by a solar-blind, self-quenching, photon-counting sensor tube. The presence of certain gases or vapors will cause some of the ultraviolet to be absorbed. The detector translates sensor tube count into vapor concentration and, with a relay, provides an electrical signal at a required gas concentration.

The vapor concentration detector automatically recalibrates itself each time power is interrupted. A calibration tube containing a vapor sample is placed in front of the UV beam while a motor turns a 360-deg calibration potentiometer. When the calibration circuit is balanced (with the vapor reference in place), the motor declutches and stops the potentiometer. The calibration tube then is returned to standby position and the system is recalibrated and ready for operation.

Perchloroethylene is a common dry-cleaning fluid and is used in both commercial

and customer-operated dry-cleaning machines. The concentration of vapors must be kept low to comply with health regulations but continuous use of ventilation equipment is usually not economical. The Honeywell Vapor Detector monitors small vapor concentrations. At 40-ppm perchloroethylene the detector will sound an alarm, turn on fans or activate any other equipment desired.

In operation each photon count from the sensor tube is amplified to provide one pulse of fixed amplitude and duration. An integrator converts these pulses to d-c with the voltage being directly related to the number of counts per second.

A 360-deg potentiometer and rectifier provides the reference voltage. A filter converts this reference voltage to d-c. The input to the meter and relay amplifier is the difference between the output of the integrators and filters. A zero center meter reads the difference. The relay amplifier operates at null with the relay closed when the integrator voltage is greater than the filtered reference voltage and open when the integrator output is less. The actual operating point is determined by the reference voltage as the relay will open when the UV sensor count rate causes the integrator output to be equal to or less than that of the filtered reference voltage.

Automatic calibration takes place when power is applied to the detector after an interruption. The calibrated tube drive motor is energized and moves the calibration tube in front of the UV beam. The potentiometer motor operates the 360-deg calibration potentiometer until it finds a balance. This compensates for any changes that may have taken place since the last calibration (such as a dirty lamp or detector) and makes the system ready for operation.

If the system cannot be calibrated, it will search for 1-1/2 minutes after which a thermal delay relay drops out. A "failure-to-calibrate" light is activated on the control panel and all fans and alarms are actuated until the problem is corrected.

The vapor detector can find and control hydrocarbons, chlorinated hydrocarbons, aromatics, ammonia and amines, industrial monomers, volatile acids, toxics, explosives, lacrymators and vesicants among others.

The Vapor Concentration detector is a development of Honeywell, Minneapolis 8, Minn.

